**ORDER** **U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL AVIATION ADMINISTRATION**

**8260.45**

**11/4/97**

**SUBJ: Terminal Arrival Area (TAA) Design Criteria**

**1. PURPOSE.** This order defines TAA design criteria and establishes the Basic T segment configuration as standard for area navigation (RNAV) approach procedures within the TAA.

**2. DISTRIBUTION.** This order is distributed in Washington headquarters to the division level of the Air Traffic Service; the Offices of Airport Safety and Standards, and Communications, Navigation, and Surveillance Systems; to Flight Standards Service; to the National Flight Procedures Office; the Regulatory Standards and Compliance Division at the Mike Monroney Aeronautical Center; the regional Flight Standards divisions; and to special military and public addressees.

**3. BACKGROUND.** Historically, transition from en route flight to the terminal environment required specific ground tracks defined by ground based navigational aids. These transitions were difficult to develop in areas where terrain features interfered with signal propagation and reception. The advent of RNAV navigation systems independent of conventional ground navigation aids (NAVAID's) created the possibility of establishing a new transition system. Efforts toward standardization of efficient approach segment configurations generated the TAA random arrival concept.

## SECTION 1. GENERAL

**4. CRITERIA.** FAA Order 8260.3B, United States Standard for Terminal Instrument Procedures (TERPS), FAA Order 8260.38A, Civil Utilization of Global Positioning System (GPS), FAA Order 8260.40A, Flight Management System (FMS) Instrument Procedures Development, and FAA Order 8260.19C, Flight Procedures and Airspace, apply unless otherwise noted. Do not publish a minimum safe altitude for an approach published with a TAA.

## SECTION 2. TAA AND APPROACH SEGMENT CONSTRUCTION

**5. INITIAL, INTERMEDIATE, FINAL, AND MISSED APPROACH SEGMENTS.** The following application guidelines are specific to the TAA. The BASIC T approach segment configuration as described below is standard.

**a. Initial Alignment to the Intermediate Segment.** The alignment of the initial segment to the intermediate segment is 90°. See figure 1A. Determine the minimum length of the T initial segments by referring to **table 1**. Use the value for the highest approach category published on the procedure. Descent gradient considerations may require longer segment lengths. Maximum leg length is 10 NM. If initial segment descent gradient criteria cannot be met, eliminate the T initial approach fix (IAF). Then, aircraft arriving from the direction of the eliminated T IAF will fly the course reversal holding pattern. See figure 1B. For parallel runway configurations, construct T IAF's so that they serve all parallel intermediate segments. See figure 1C.

**Distribution:** A-W(AT/AS/ND/FS)-2; AVN-100 (100 cys); AMA-200 (80 cys); A-X(FS)-2; Special Military and Public Addressees

**Initiated By:** AFS-400

**FAA Form 1320-1 (6-80)** *** U.S. GPO: 1992-668-634**

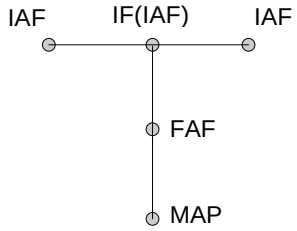



Figure 1A. BASIC T

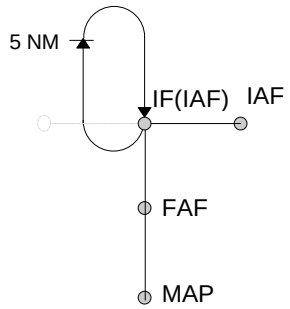



Figure 1B. BASIC T With An IAF

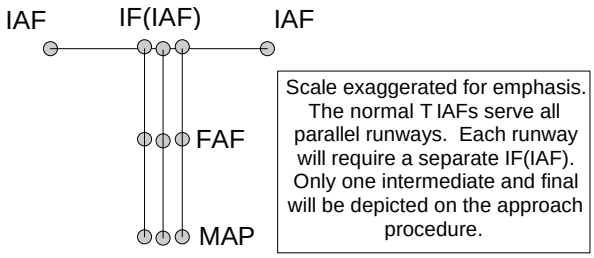



Figure 1C. Parallel Runway Application

| Category | Minimum Length (NM) |
|---|---|
| A | 3 |
| B | 4 |
| C | 5 |
| D | 5 |
| E | 6 |

Table 1. Minimum Initial Segment Length

**b. Intermediate Alignment to the Final Segment**. Align the intermediate segment with the final segment; i.e., turns over the final approach fix (FAF) are not allowed.

**c. Establish a holding** in lieu of a procedure turn (PT) at the IF (IAF). The inbound holding course shall be aligned with the inbound intermediate course. See figure 1B.

**d. OPTIMALLY, construct missed approach segments** to allow a "direct entry" into a missed approach holding pattern as illustrated in figure 2A. If the missed approach routing terminates at a T IAF, OPTIMUM alignment of the missed approach holding pattern is with the initial inbound course, with a direct entry into holding. See figure 2B.

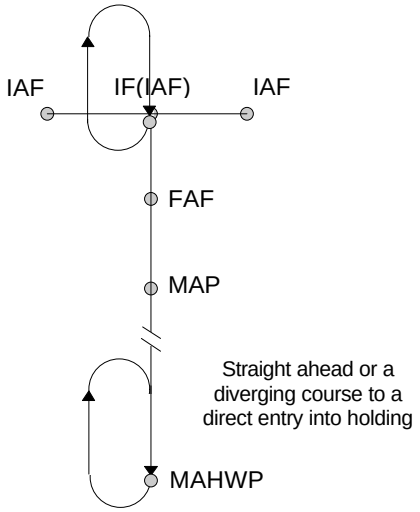



Figure 2A. OPTIMUM Missed Approach Holding

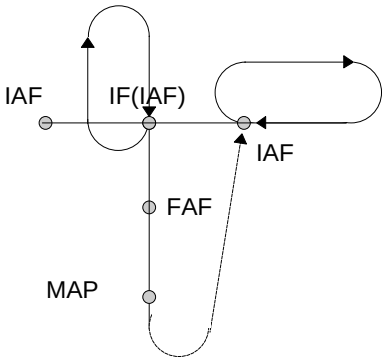



Figure 2B. Missed Approach Holding At An IAF

**6. STANDARD TAA AREAS** The standard TAA contains three areas defined by the BASIC T segment centerline extensions: the straight-in area, the left base area, and the right base area. See figure 3A.

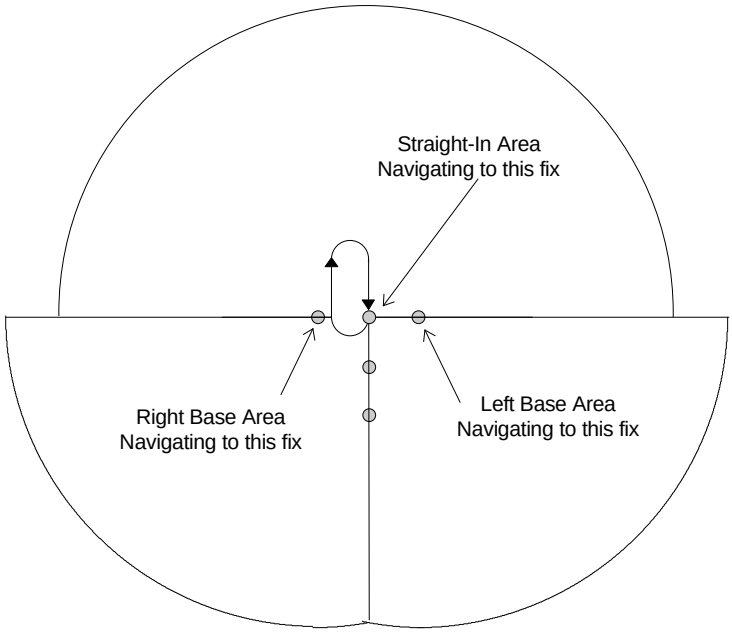



Figure 3A. Standard TAA

**a. Straight-In Area.** The arc boundary of the straight-in area is equivalent to a feeder fix. When crossing the boundary or when released by ATC within the straight-in area, an aircraft is expected to proceed direct to the IF (IAF).

**(1) Construction.** Draw a straight line through the T IAF's, extending 30 NM in each direction from the IF. Then, on the side of the line away from the airport, scribe a 30 NM arc centered on the IF connecting the straight line end points. See paragraph 7b and figure 3B.

**(2) Obstacle Clearance.** The area considered for obstacle clearance includes the entire straight-in area and its associated buffer areas. See paragraph 7b and figure 3B. TERPS paragraph 1720 applies.

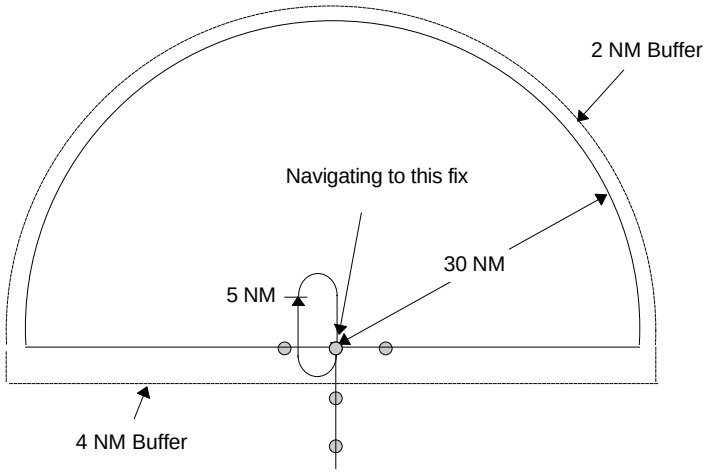



Figure 3B. Straight-In Area

**b. Right Base Area.** The arc boundary of the right base area is equivalent to a feeder fix. When crossing the boundary or when released by ATC within the right base area, an aircraft is considered at the feeder fix and is expected to proceed direct to the IAF.

**(1) Construction.** To construct the top boundary, extend the line from the IF through the T IAF for 30 NM beyond the T IAF. Draw a 30 NM arc, centered on the T IAF, from the end point of the top boundary counter-clockwise to the point it intersects a straight line extension of the intermediate course. See figure 3C.

**(2) Obstacle Clearance.** The area considered for obstacle clearance includes the entire right base area and its associated buffer areas. TERPS paragraph 1720 applies.

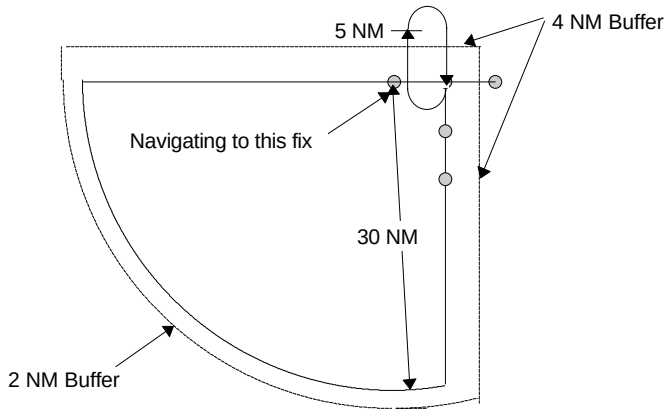



Figure 3C. Right Base Area

**c. Left Base Area.** The arc boundary of the left base area is equivalent to a feeder fix. When crossing the boundary or when released by ATC within the left base area, an aircraft is considered at the feeder fix and is expected to proceed direct to the IAF.

**(1) Construction.** To construct the top boundary, extend the line from the IF through the T IAF for 30 NM beyond the T IAF. Draw a 30 NM arc, centered on the T IAF, from the end point of the top boundary clockwise to the point it intersects a straight line extension of the intermediate course. See figure 3D.

**(2) Obstacle Clearance.** The area considered for obstacle clearance includes the entire left base area and its associated buffer areas.TERPS paragraph 1720 applies.

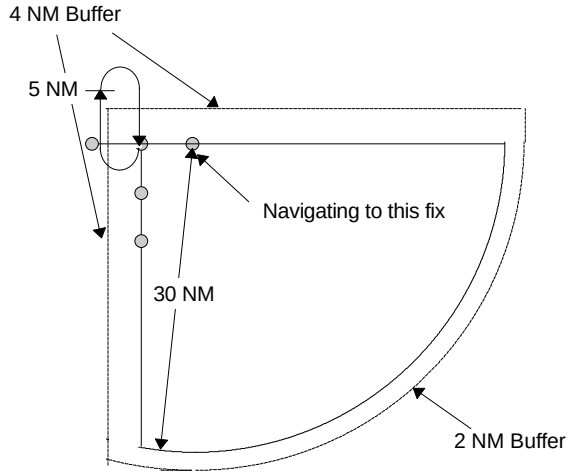



Figure 3D. Left Base Area

**7. ALTITUDE SELECTION WITHIN THE TAA.**OPTIMALLY, all TAA areas, course reversal holding pattern, initial segment, and intermediate segment minimum altitudes should be the same. When terrain or operational constraints force high area altitudes that do not allow descent within gradient limits, the course reversal pattern at the IF (IAF) will allow descent and entry into the approach procedure.

**a. Sectors/Stepdown Arcs.** The straight-in area may be divided into as many as 3 sectors defined radially (numbered magnetically inbound to the fix) from the IF (IAF) to accommodate terrain diversity or operational constraints that cause excessive descent gradients. Do not radially sectorize the left or right base areas. Stepdown arcs (centered on the fix that defines the area) may also be used, but are limited to one per sector. See figures 4A and 4C.

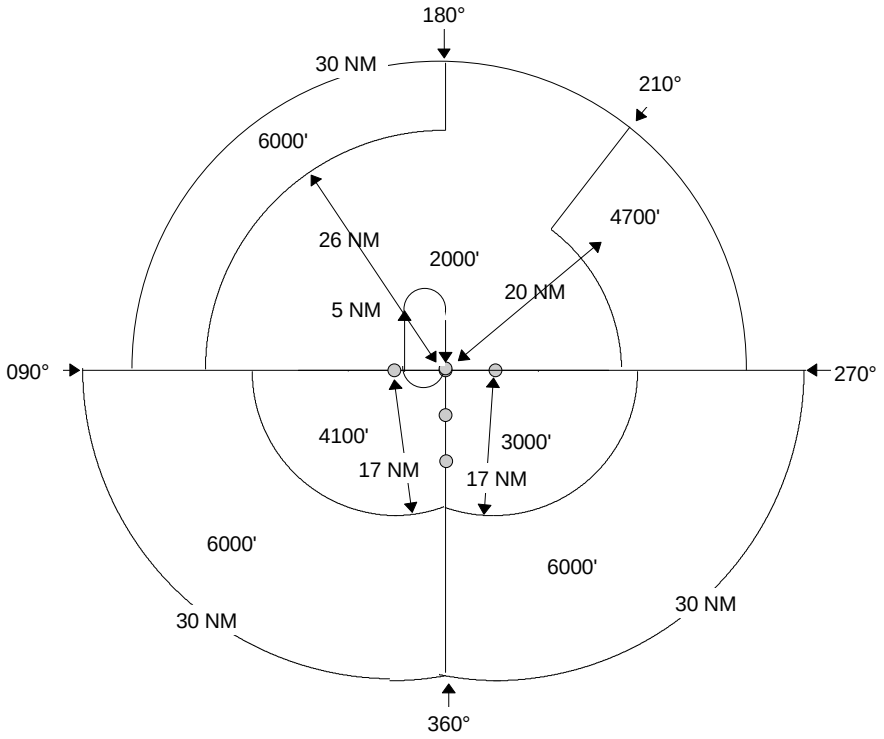
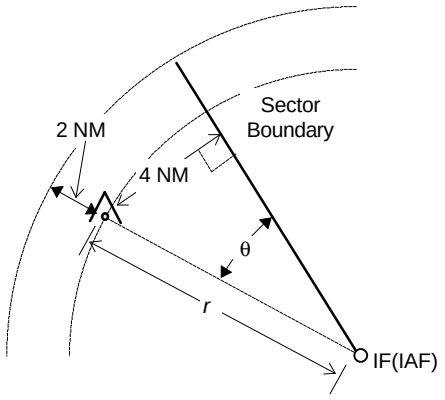



Figure 4A. A Sectorized TAA With Stepdown Arcs

**b. Altitude Sectors.** Sectors must provide appropriate required obstacle clearance within the sector boundaries and over all obstacles in a 4 NM buffer area (measured perpendicular to the radial boundary line) and in a 2 NM buffer from the stepdown arcs. See figure 4B for a method to calculate distance from a straight-in boundary line.




$$\theta = ArcSin\left(\frac{4}{r}\right)$$

where: $\theta$ = angle in degrees
$r \geq 4$ NM

e.g. If $r = 8$ then

$$\theta = ArcSin\left(\frac{4}{8}\right) = 30°$$

Figure 4B. Calculating Radial Sector Boundaries

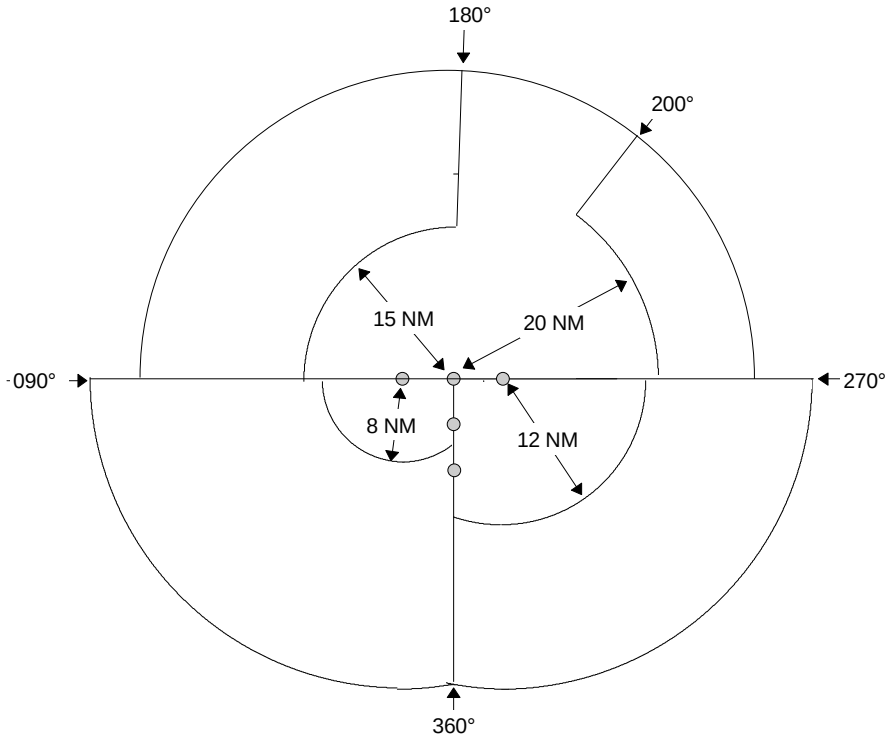



Figure 4C. TAA Maximum Sectorization
With Maximum Stepdown Arcs

**8. TAA AREA MODIFICATONS.** Modifications to the standard TAA design may be necessary to accommodate operational requirements. Variations may eliminate one or both base areas, and/or limit or modify the angular size of the straight-in area. If the left or right base area is eliminated, modify the straight-in area by extending its 30-mile radius to join the remaining base area boundary. If the left and right base areas are eliminated, extend the straight-in 30-mile radius to complete 360° of arc. Construct a PT required sector in the extended straight-in area as necessary to accommodate entry at the IF (IAF) at angles greater than 120°. When initial to intermediate course intercept angles are between 90° and 120°, apply TERPS table 3 to determine the minimum intermediate segment length. This sector does not count toward the sectorization limitation stated in paragraph 7a. See figures 5B-5E.

**9. CONNECTION TO EN ROUTE STRUCTURE.** Normally, a portion of the TAA will overlie an airway. If this is not the case, construct a feeder route from an airway fix or NAVAID to the TAA boundary aligned along a direct course from the en route fix/NAVAID to the appropriate T IAF(s). See figure 5F.

**10. AIRSPACE REQUIREMENTS.** The TAA should be wholly contained in controlled airspace. The TAA will normally overlie Class “E” 1,500' airspace (1,200' floor). If the TAA overlies Class B airspace, in whole or in part, the Air Traffic facility exercising control responsibility for the airspace may recommend minimum TAA sector altitudes. Modify the TAA to accommodate controlled/restricted/warning areas as appropriate.

**a. The TAA will normally overlie controlled airspace** and in the eastern 33 states, minus the upper Peninsula of Michigan and a portion of southwest Texas; this will occur automatically.

**b. When notified that an RNAV approach** and a standard TAA are being initiated for an airport not underlying controlled airspace, the regional Air Traffic division(s) shall initiate rulemaking action to establish a 1,200 feet above ground level Class E airspace area with a 40 NM radius of the airport reference point (ARP). If a modified TAA is proposed, the airspace will be sized to contain all or most of the TAA.

Note: Depending on the location of the ARP and the length of the runway(s), a 40 NM radius will not totally contain the TAA. This is acceptable to Air Traffic and Flight Standards Services.

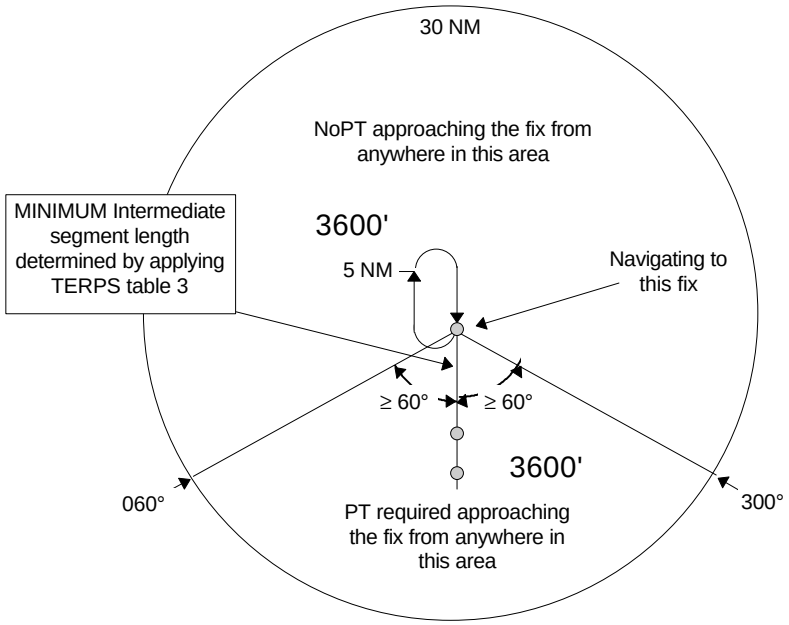



Figure 5A. TAA With Left and Right Base Areas Eliminated

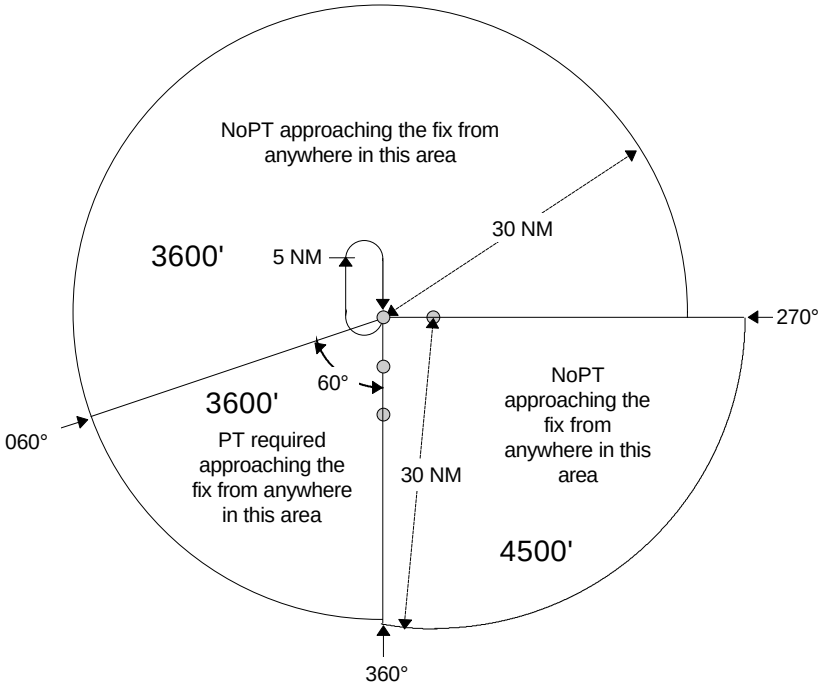



Figure 5B. TAA With Right Base Eliminated

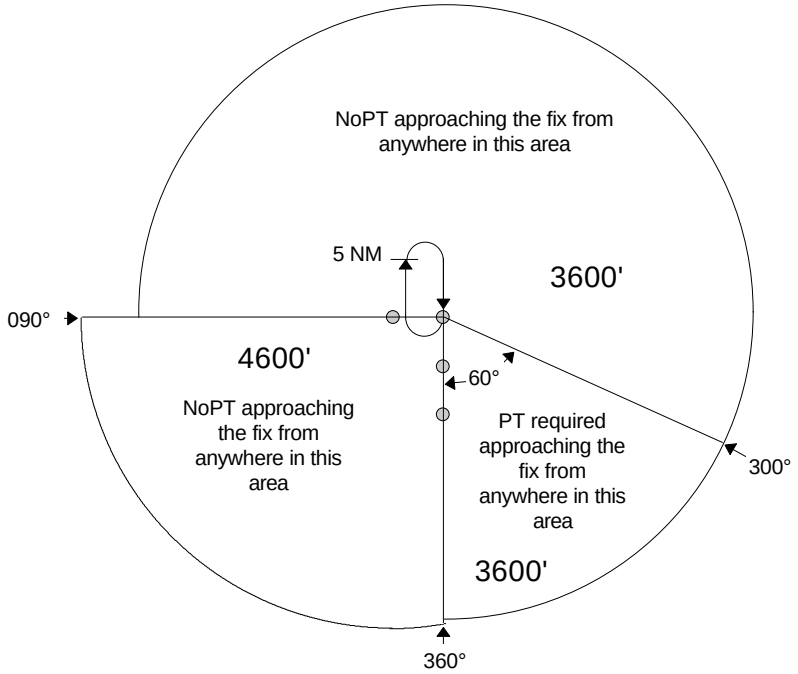



Figure 5C. TAA With Left Base Eliminated

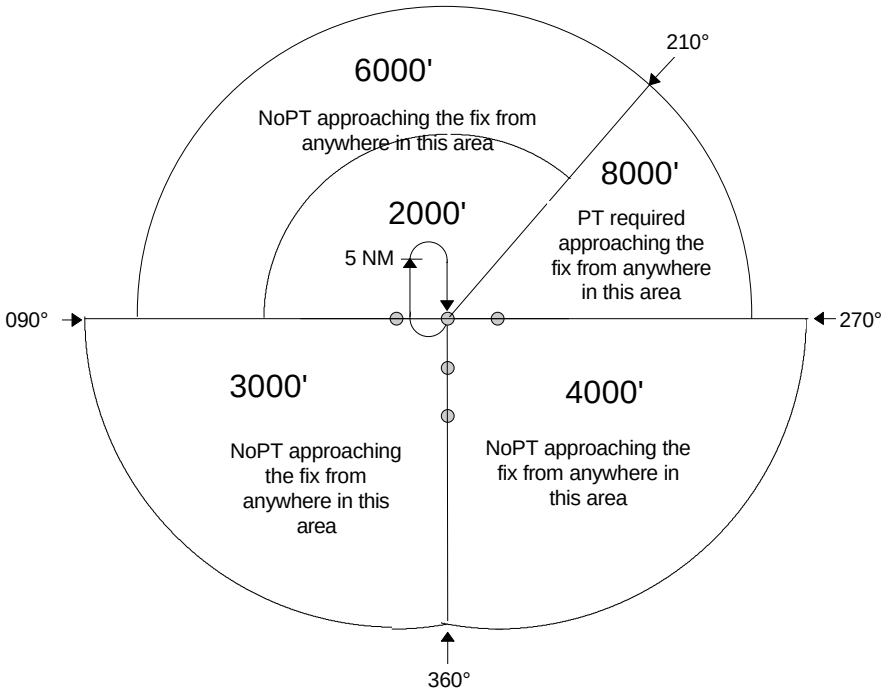



Figure 5D. TAA With Part Of Straight-In Area Eliminated

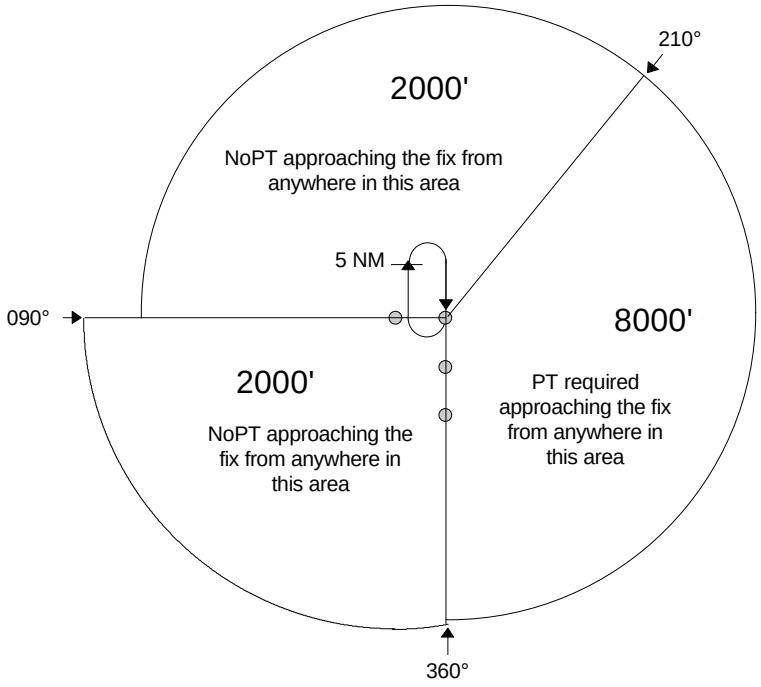



Figure 5E. TAA Example With Left Base and Part of Straight-In Area Eliminated

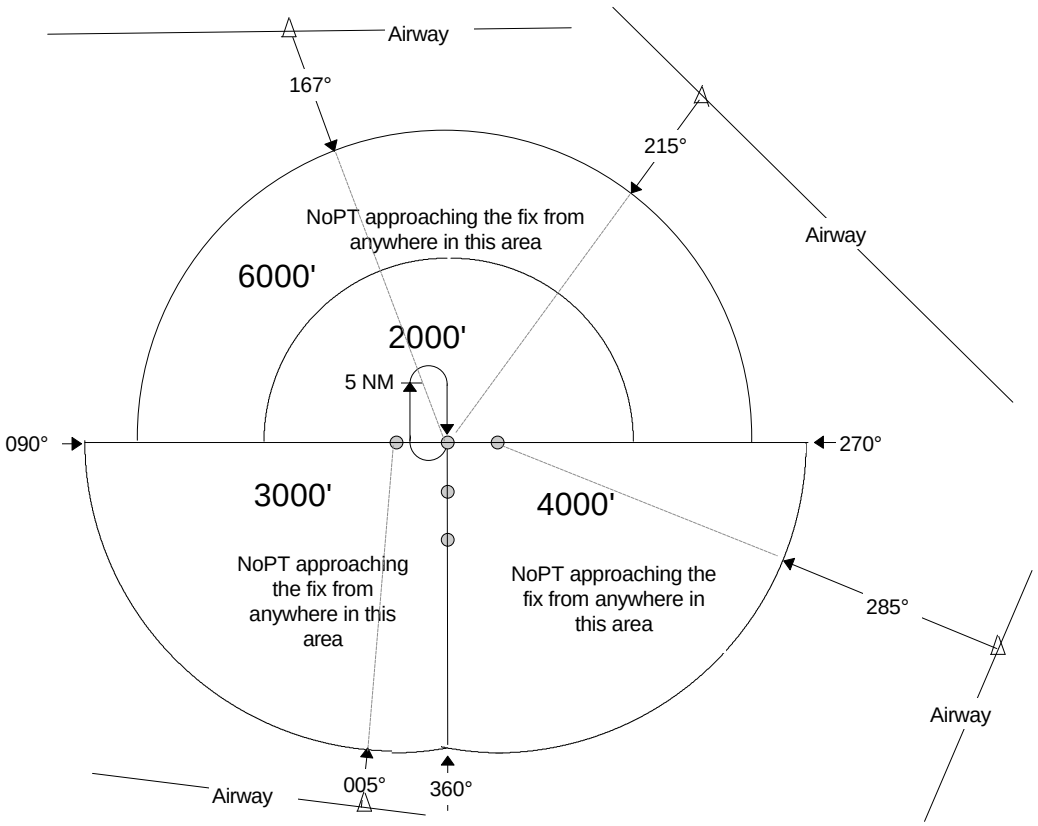



Figure 5F. Examples Of A TAA With Feeders From An Airway

## SECTION 3. DOCUMENTATION AND PROCESSING

### 11. FAA 8260-SERIES FORMS INSTRUCTIONS.

**a. Documenting the TAA.** Enter all normal terminal route and TAA information on the appropriate FAA 8260-series forms. If the entire TAA cannot be documented on the 8260-3/5/7, enter all TAA data on an FAA Form 8260-10, Emergency DF Approach Procedure. For TAA entries, the "From" and "To" entries do not describe routes of flight, but rather describe a volume of airspace within which an aircraft will proceed inbound from the 30-mile arc boundary toward an associated T IAF. Enter the data in the specified standardized format detailed below to assist cartographers in developing the desired published display. Each entry shall coincide with the corresponding entry on FAA Form 8260-9, Standard Instrument Approach Procedure Data Record, to provide correlation between terrain/obstacle data and the minimum altitude associated with the appropriate TAA area. Provide a graphic depiction of the TAA with areas defined and indicate the minimum altitude associated with each area/sector. Do not establish minimum altitudes which will require aircraft to climb while inbound toward the respective T IAF. Comply with existing instructions in FAA Order 8260.19C relative to Terminal Routes, except as noted below:

**(1) From**. For TAA entries, begin at the outermost boundary, and work inward toward the respective T IAF. Enter an area/sector description beginning at a bearing from the IF that is perpendicular to the intermediate course, on the right base side of the TAA, and proceed

in a clockwise direction. Enter the magnetic value of the straight line boundary (or its extension) described "TO" the associated T IAF, followed by the arc boundary distance (NM) for that point, and separate the entries by a "/"; e.g., **090/30**. Then enter "**CW**", followed by a point along the same arc boundary intersected by the next straight line boundary; e.g. **180/30**. The "From" entry would thus appear as "090/30 CW 180/30." Enter data in a similar manner to describe other areas and sectors.

**(a)** Sequentially number (1, 2, etc.) the first line entry describing the area/sector for which different minimum altitudes are established. It is possible for an area/sector to be irregularly shaped, but have only one minimum altitude. Enter the associated data for such an area together as a group of sequential line entries.

**(b)** The charting agency will publish the words "NoPT" or "PT Required", as appropriate, on the 30-mile arc boundary between an associated straight line boundary pair. Enter "**NoPT**" or "**PT Required**" following each line entry which contains the specific 30-mile arc boundary for which that label is appropriate.

**(2) To**. Enter area/sector straight line/arc boundary descriptions as above, which *in combination with* the associated entry in the "From" block, encloses the area being documented. For example, the "To" stepdown arc entry associated with the "From" entry above, could be "090/22 CW 180/22." Where the area/sector inwardly terminates at a T IAF, enter the appropriate WP name and fix type; e.g., POPPS IF (IAF), MAACH IAF, etc.

**(3) Course and Distance**. No entry is required for TAA area/sector documentation. The provisions of Order 8260.19C apply where a route is established.

**(4) Altitude.** Enter the minimum altitude of the area/sector on each line.

**b. FAA Form 8260-9, Standard Instrument Approach Procedures (SIAP) Data Record**. Comply with existing Order 8260.19C instructions for documenting controlling obstacles/terrain, coordinates, minimum altitudes, etc., except as noted below:

**(1) Part A, Block 1 - App. Segment**. Enter the number assigned to the particular area/sector as in paragraph 11a (1) (a). Then enter associated documenting data across the form.

**(2) Part A, Block 5 - Minimum Safe Altitudes**. Leave blank.

**(3) Part C - Remarks**. Do not develop airspace data for the TAA. Develop airspace data for the approach procedure contained within the TAA under Order 8260.19C, paragraph 909c(6).

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

GPS **STANDARD INSTRUMENT APPROACH PROCEDURE**

FLIGHT STANDARDS SERVICE - FAR PART 97. 33

Bearings, headings, courses, and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH, and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above airport elevation. Distances are in nautical miles unless otherwise indicated, except visibilities which are in statute miles or in feet RVR.

| FROM | TO | ALTITUDE |
|---|---|---|
| 1. 090/30 CW 180/30 (NoPT) | 090/22 CW 180/22 | 6000 |
| 2. 210/30 CW 270/30 (NoPT) | 210/20 CW 270/20 | 4700 |
| 3. 090/22 CW 180/22 | POPPS IF(IAF) | 2000 |
| 180/30 CW 210/30 (NoPT) | POPPS IF(IAF) | 2000 |
| 210/20 CW 270/20 | POPPS IF(IAF) | 2000 |
| 4. 270/30 CW 360/30 | 270/17 CW 360/17 | 6000 |
| 5. 270/17 CW 360/17 | MAACH IAF | 3000 |
| 6. 360/30 CW 090/30 | 360/17 CW 090/17 | 6000 |
| 7. 360/17 CW 090/17 | SISSY IAF | 4100 |

(This relates to Figure 6A)

| CITY AND STATE | ELEVATION: 123 TDZE: 123<br>AIRPORT NAME: | FACILITY IDENTIFIER: | PROCEDURE NO. / AMDT NO. / EFFECTIVE DATE: | SUP: |
|---|---|---|---|---|
| ANYWHERE,CA | ANYTIME ARPT | ANY | GPS RWY 18 | AMDT: NONE<br>DATED: |

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

GPS

## STANDARD INSTRUMENT APPROACH PROCEDURE

FLIGHT STANDARDS SERVICE - FAR PART 97. 33

Bearings, headings, courses, and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH, and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above airport elevation. Distances are in nautical miles unless otherwise indicated, except visibilities which are in statute miles or in feet RVR.

| FROM | TO | ALTITUDE |
|---|---|---|
| 1. 090/30 CW 210/30 (NoPT) | 090/17 CW 210/17 | 6000 |
| 2. 090/17 CW 210/17 | ALPHA IF(IAF) | 2000 |
| 3. 210/30 CW 270/30 (PT Required) | ALPHA IF(IAF) | 8000 |
| 4. 270/30 CW 360/30 (NoPT) | BRAVO IAF | 4000 |
| 5. 360/30 CW 090/30 (NoPT) | CHRLY IAF | 3000 |

(This relates to Figure 6B)

| CITY AND STATE | ELEVATION: 123 TDZE: 123<br>AIRPORT NAME: | FACILITY IDENTIFIER: | PROCEDURE NO. / AMDT NO. / EFFECTIVE DATE: | SUP: |
|---|---|---|---|---|
| ANYWHERE, CA | ANYTIME ARPT | ANY | GPS RWY 18 | AMDT: NONE<br>DATED: |

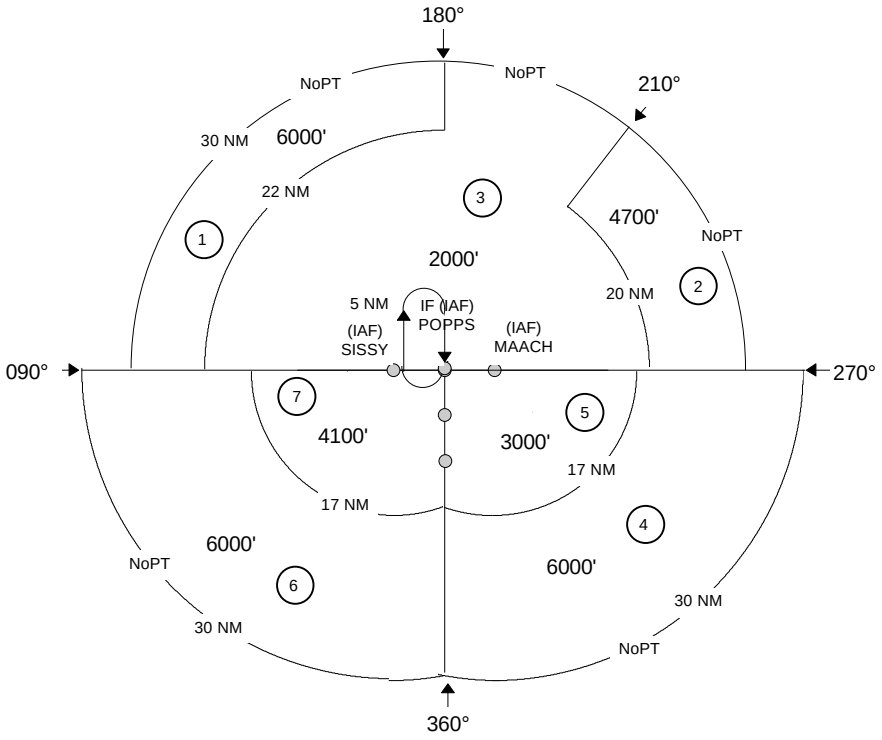



Figure 6A. Example 1

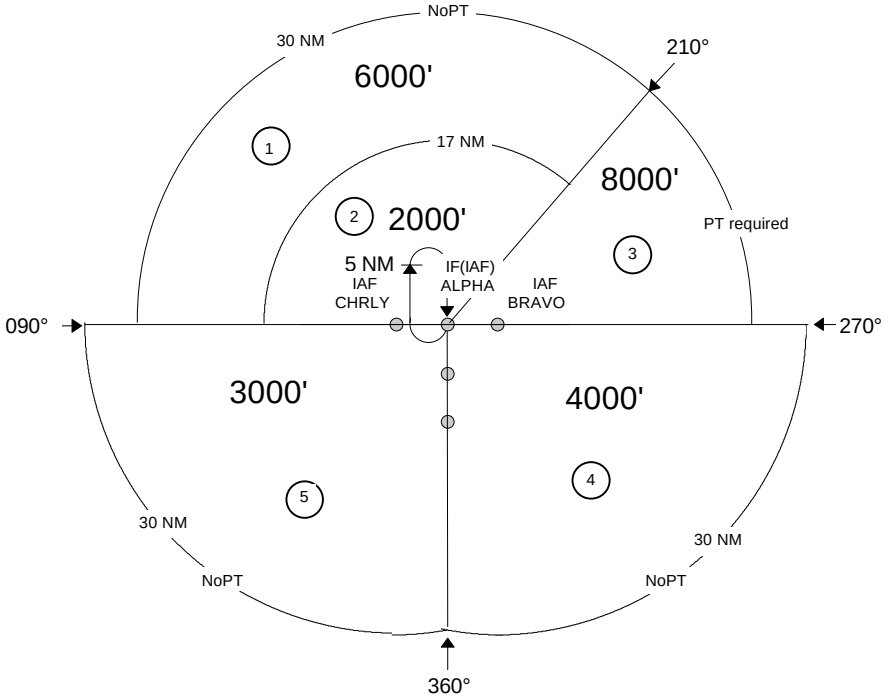



Figure 6B. Example 2

## SECTION 4. DIRECTIVE FEEDBACK INFORMATION

**12. INFORMATION UPDATE.** Forward for consideration any deficiencies found, clarification needed, or suggested improvements regarding the content of this order to:

DOT/FAA
ATTN: Flight Procedures Branch, AFS-440
P.O. Box 25082
Oklahoma City, OK 73125

a. **FAA Form 1320-19, Directive Feedback Information,** is included as the last page of this order, for your convenience. If an interpretation is needed immediately, you may call the originating office for guidance. Use this form as a follow-up to the verbal conversation.

**b. Use the "Other Comments"** block of this form to provide a complete explanation of why the suggested change is necessary.

Thomas E. Stuckey
Acting Director, Flight Standards Service